



## Rebuilding a Waterfall

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Hinckley Lake Dam is a Class I (high hazard) Dam in Medina County, Ohio, that is the center of the Cleveland Metropark's Hinckley Reservation. The dam was originally constructed in 1928, and it did not meet current dam safety guidelines. Deficiencies included: the existing lake drain was not functional; the dam did not pass/store the design storm; and the existing concrete principal spillway weir did not meet current stability criteria. The project was delivered by Construction Manager at Risk delivery method, with The Great Lakes Construction Company. This delivery method provided the Owner with benefits during construction, allowing for easier changes in the work when issues were encountered, and also to make aesthetic changes at the Metroparks request. Michael Baker evaluated multiple alternatives to bring the dam into compliance with current dam safety standards. The selected alternative was to raise the embankment (with a downstream raising and the use of non-overflow walls near the spillway) and to rehabilitate the existing principal spillway. The primary feature of the original spillway was an aesthetic "waterfall" in the center of the weir, and the improvements needed to maintain this feature. Artesian groundwater conditions were encountered during the subsurface exploration, which impacted both the design of the spillway rehabilitation and the control of water during construction.

Challenges of the project included:

- Existing drawings were limited, leading to changes during construction as features were exposed.
- Difficulty maintaining a drained pool due to heavy precipitation.
- Construction with mass concrete which required monitoring of concrete temperatures during curing;
- Use of new concrete mix designs featuring Type 1L Cement;
- Encountering seepage in the excavations, despite having no pool in the reservoir, which required modifying the seepage collection system;
- Raising of the existing embankment using off-site soils. The borrow pit was then backfilled with dredge spoils later in the project;
- Redesigning new non-overflow walls when excavation encountered a concrete core wall, which was not depicted on the original plans.
- Settlement of a new non-overflow wall soon after construction was completed. Additionally, when the spillway was first engaged, nappe oscillation was observed. Michael Baker and Metroparks are currently evaluating options to address this, and the Contractor has installed three test sections to evaluate the benefits.